

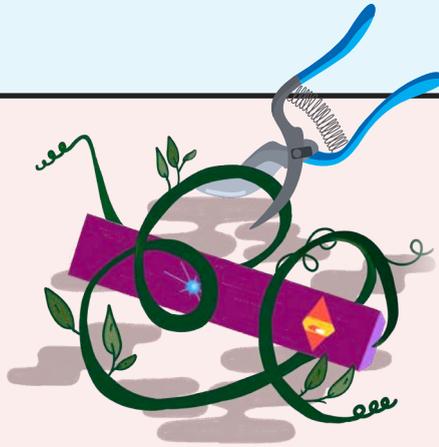
Heads Up: Real News About Drugs and Your Body

Brought to you by Scholastic and the scientists at the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services

STUDENT ARTICLES INSIDE

How Nicotine Affects the Teen Brain

PAGE 2



Prescription Stimulants: What You Need to Know

PAGE 4



Stressed Out?

PAGE 6



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HOW **NICOTINE** AFFECTS THE TEEN BRAIN

Found in both conventional cigarettes and most vaping devices, nicotine is a highly addictive drug with many health risks for teens.

First, some good news: The number of teens who smoke cigarettes today is less than half of what it was 10 years ago. This decrease is a great win for the overall health of young people, but experts are still concerned. Why? While youth cigarette use is decreasing, the number of teens who use vaping devices, or e-cigarettes,

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has been increasing. Just like regular cigarettes and smokeless tobacco, most vaping devices contain **nicotine**. In fact, one cartridge of the Juul brand and some disposables like Puff Bars have as much nicotine as a whole pack of cigarettes. No matter what product it comes in, nicotine is a highly addictive drug and a serious risk.

How Addiction Happens

Our brains come with a built-in reward system. When you do anything enjoyable—like laughing—your brain releases a natural chemical called **dopamine**. In essence, dopamine says to your brain, “Hey, I like this activity. It’s worth remembering and repeating.”

Nicotine takes advantage of that same reward system. When someone inhales nicotine, the drug enters the brain and triggers a surge of dopamine. But the amount of dopamine released is much greater than that from pleasurable everyday activities like eating a favorite food. Nicotine also causes the dopamine levels to remain elevated for longer than normal. The result: The brain receives a strong signal that it really wants to vape some more. Over time, this can lead to **addiction**, a disorder that causes a person to continue taking a drug, despite negative consequences.

Long-Term Effects

Once someone has a nicotine addiction, quitting can be very difficult. One reason is that they may have **withdrawal symptoms** (such as cravings, depression, anxiety, and problems focusing and sleeping) just a few hours after they stop using nicotine. The person has a strong urge to vape again to relieve these symptoms, which makes it even harder for them to stop.

Repeated exposure to surges of dopamine from nicotine can change how the brain reacts to natural levels of dopamine. When this happens, activities a person used to like may seem less enjoyable. Nicotine can also cause long-lasting changes to the brain circuits that control memory and self-control—leading to learning issues.

Sometimes people turn to nicotine because they’re stressed, but using the drug can actually lead to

anxiety. If a person becomes dependent on nicotine, they can experience irritability and anxiety when they are without it for too long.

Protecting Your Brain

Your young brain is still developing. In fact, it won’t fully mature until you reach your mid-twenties. That leaves teens especially vulnerable to the negative effects of nicotine, including addiction. Studies have shown that teens who use e-cigarettes are more likely to continue using nicotine as adults, and may be at greater risk of eventually smoking conventional cigarettes.

On the bright side, you have an opportunity during your teen years. If you avoid drugs like nicotine and instead take on healthy and stimulating challenges—learning to cook, playing an instrument, creating videos—you can affect your brain development in positive ways that can last a lifetime.



GETTING HELP

Visit teen.smokefree.gov/quit-vaping for teen-focused tools and tips, including:

- » More facts on nicotine risks
- » Ways to deal with stress and anxiety
- » How to quit vaping

ADHD is usually diagnosed during childhood or adolescence. Kids with ADHD struggle to pay attention, may fidget often, and may be more hyperactive and impulsive than other children their age. For teens, ADHD can make it challenging to finish schoolwork and focus on tasks.

Prescription stimulants can help kids and teens with ADHD manage these symptoms, making life easier at school and at home. But misusing these drugs can be dangerous. Teenagers who take a higher dose than what their doctor prescribed, take the medication even though they don't have ADHD, or take someone else's prescription can wind up with serious health problems, including addiction.

ADHD AND THE BRAIN

Dopamine and **norepinephrine** are two chemicals in your brain. A careful balance of these chemicals is required for fast processing by brain circuits involved in problem-solving. Scientists have observed that people with ADHD have differences related to these brain chemicals. Prescription stimulants work in the brain to boost and balance levels of dopamine and norepinephrine. When prescribed by doctors, these medications (along with behavior therapy) can help kids with ADHD pay attention and focus.

DANGERS OF MISUSE

Prescription stimulants are strong medications, which is why kids with ADHD who take them must be carefully monitored by their doctor. A doctor will track whether the medication is improving ADHD symptoms, watch for any negative side effects, and adjust the dosage if necessary.

Scientists have learned that misusing stimulants can be very dangerous—and the effects are unpredictable. What could happen if a teen with ADHD takes a higher dose than their doctor prescribed? Or if kids who don't have ADHD try a friend's meds because they think it will help them do better on a test? When taking prescription stimulants under these circumstances, kids may experience scary side effects, including a pounding heart, anxiety, extreme anger, and paranoia—and even life-threatening conditions like stroke and heart attack.

ADDICTION RISK

Misusing a prescription stimulant also puts a teenager at risk for **addiction**. The drugs cause a surge of the chemical dopamine in the brain, which programs the brain to want this experience again. This increases the chance that someone will start taking the drug over and

EFFECTS ON SCHOOL PERFORMANCE

Research shows that prescription stimulants can help academic performance for kids with ADHD, but stimulant misuse is linked to poorer grades in school. Why?

- ✓ Stimulants keep you awake, but they can also make you jittery, anxious, irritable, and paranoid.
- ✓ Stimulants may improve certain skills (like focus) at the expense of others (like creative thinking).

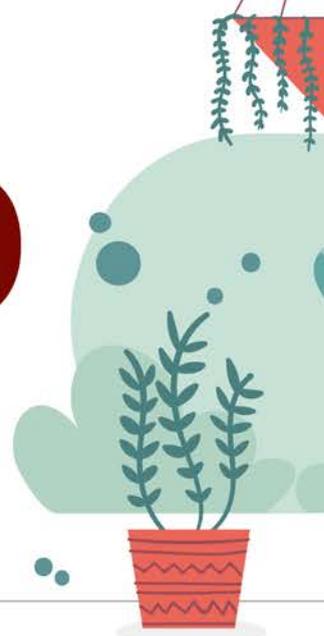
over, and ultimately can lead to addiction.

People facing addiction often suffer devastating physical and emotional consequences. A teen with addiction can damage important family relationships, lose touch with friends, have serious problems at school, and quit activities they once loved. If they try to stop using the drug, they may experience withdrawal symptoms such as depression, fatigue, and insomnia. These symptoms may even cause the teen to return to using the drug.

Prescription stimulants have been shown to be safe and effective when taken as prescribed for ADHD. Like any prescription drug, it's important that the medications are taken correctly and under a doctor's care.

STRESSED OUT?

Learn how the body responds to stress—and healthy ways to cope.



YOUR BODY UNDER PRESSURE

Think of a time you were stressed. You may remember your heart racing, palms sweating, shoulders tensing up.

These reactions are part of the body's natural stress response. When the brain perceives a threat, it triggers a release of chemicals that prepare the body for the challenge.

Known as “fight or flight,” the stress response evolved to help us survive (imagine an early human chased by a lion). But it can also be triggered by events that aren't life-threatening. You may feel stressed by school demands, personal relationship struggles, or social media pressures. National or global challenges can also cause stress, such as the COVID-19 pandemic and social issues like racial discrimination.

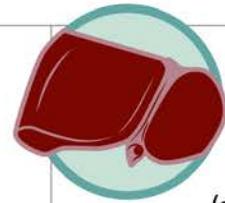
Feeling some stress is normal and can even be helpful. For example, the stress response can boost your energy and focus for a test. But constant stress can take a toll on your health. Here's why it's important to recognize when you are feeling overwhelmed and to take actions that can help you cope.



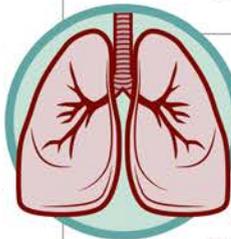
BRAIN: When you feel stressed, the brain sends a signal to the adrenal glands (located above the kidneys). The signal triggers the glands to release stress hormones. These chemicals cause changes to the body to prepare it to fight or run away (the “flight” response).



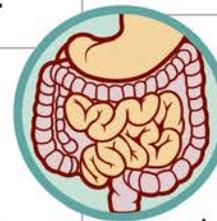
HEART: Heart rate and blood pressure increase so that blood travels through the body faster. This helps deliver oxygen to make muscles work.



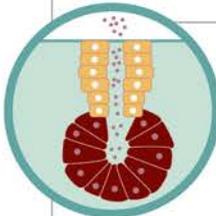
LIVER: The liver releases glucose (sugar) into the bloodstream. This powers cells in the body.



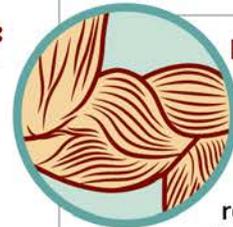
LUNGS: Breathing rate increases to deliver more oxygen to muscles and tissues.



STOMACH/INTESTINES: Digestion decreases so that the energy needed to break down food can be redirected to other parts of the body.



SWEAT GLANDS: Stress can trigger sweat to be released from some parts of your body. Stress-sweat is different from sweat caused by being hot.



MUSCLES: Muscles tense up throughout the body to prepare for responding with action.

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HEALTHY TIPS TO HELP YOU COPE



MOVE YOUR BODY: Regular aerobic exercise, like running, activates a response that helps your body cope with emotional stress.



MEDITATE: Meditation and deep breathing exercises can help you decrease blood pressure and improve symptoms of anxiety and depression.



TAKE A TIME-OUT: Stepping away from distractions, such as social media and texting, may be stressful at first, but with practice it can help you relax.



DO ONE THING AT A TIME: If you feel overwhelmed with multitasking, try to tackle one challenge at a time.



GET SUPPORT: If you are stressed, ask for help from your family, friends, or a professional, such as a doctor or school counselor.



RELAXING DURING A TEST: If you experience stress during a test, you may feel your mind “go blank.” This happens because norepinephrine—a stress hormone—may temporarily disrupt brain circuits that are used to recall memories.

TIP: If you experience your mind going blank, pause for a moment, take a deep breath, and try to relax to help the hormone surge ease off. *You’ve got this.*



CHRONIC STRESS

Ongoing, or chronic, stress does not allow the body’s stress hormones to return to normal levels. This can lead to health problems. Chronic stress can:

- ▶ Increase the risk of getting sick by weakening your immune system
- ▶ Cause sleep problems because of the energy surge brought on by stress hormones
- ▶ Lead to headaches from constant muscle tension
- ▶ Increase the risk of anxiety and depression
- ▶ Lead to problems with learning and memory
- ▶ Increase the risk for heart disease, obesity, and diabetes

STRESS AND DRUG USE: NOT A GOOD MIX

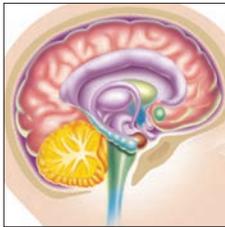


Talking to a doctor about medical treatments to deal with stress can be helpful. Attempting to relieve stress by misusing prescription drugs or using substances like alcohol, tobacco, cannabis, or other drugs may actually make it harder to cope.

Substance use can affect the brain and body in the same way as stress does. For example, some drugs increase heart rate and anxiety, which causes the body’s stress response to increase—not decrease. Even drugs like alcohol that appear to alleviate stress in the short-term increase the body’s stress response over time. People who are stressed are also at higher risk for developing addiction.

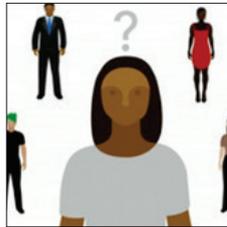
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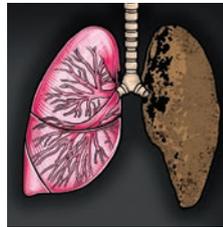
Articles and infographics on the effects of drugs

Videos



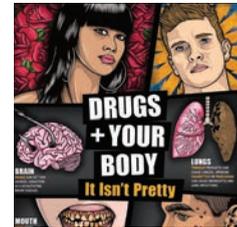
Videos that illustrate the science of drug misuse

Interactives



Interactives that explore important scientific info

Posters



Posters on the impact of drugs on a person's brain, body, and life

COMPILATION 2020-21: Student Edition

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